

Employee Involvement
White Collar Work Force (Phase 1)

UNITED STATES NAVY
David Taylor Research Center

in cooperation with
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FINAL REPORT

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EMPLOYEE INVOLVEMENT - WHITE-COLLAR WORK FORCE

(Phase I)

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In behalf of
SNAME Ship Production Committee Panel SP-5
on
Human Resources Innovation

Under the
National Shipbuilding Research Program

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PREFACE

The National Shipbuilding Research Program is sponsored by the Maritime Administration, United States Department of Transportation, and by the United States Navy toward improving productivity in shipbuilding. An important part of this Program is carried out by SNAME Ship Production Committee Panel SP-5 on Human Resources Innovation. This Task was conceived by Panel SP-5 as an initial probe into the white-collar workforce in a representative shipyard. This area had not previously been investigated, creating the potential for improvements through employee involvement techniques.

The Task reported herein (N5-89-4) was conducted by Robinson-Page-McDonough and Associates, Inc. (R-P-M) under National Steel and Shipbuilding Company (NASSCO) Purchase Order No. MU142009-D. Task Director was Rodney A. Robinson, Vice President of R-P-M. The host shipyard was Peterson Builders, Inc. (PBI), Sturgeon Bay, WI. Performance of the Task began in April, 1990 and was completed in July, 1991.

Appreciation is expressed to Dan Kressig and Tim Nelson of PBI for their help in setting up and supporting this project, to the members of both Action Teams for making things happen, and to the senior management at PBI for hosting this important research.

EXECUTIVE SUMMARY

This Task has investigated the improvement of white-collar productivity in a shipyard through employee involvement techniques. Two functional areas of the host shipyard, electrical and structural (hull), were investigated through the use of Action Teams composed of both white-collar and blue-collar workers. The approach was (1) to improve communications in both directions, and (2) to strengthen working relationships among the groups represented on the teams.

Meetings of each Action Team were held for one hour per week. At first the meetings were controlled by a Facilitator to ensure that the subject matter and the ensuing discussions stayed on the track. After about 7 meetings, both teams selected a Chairman and a Recorder from within their membership, and thereafter the involvement of the Facilitators was progressively reduced. Many subjects were treated, but white-collar productivity remained the real target.

After six months of operation, the Action Teams had proven their worth, and the Task was concluded. This Final Report explains the actions taken to set up and implement the Action Teams. They were sufficiently successful that the senior management at PBI (the host shipyard) intends to continue them beyond the completion of this Task. Furthermore, active consideration is being given to establishing similar Action Teams in the other functional areas of the shipyard. Clearly, this research effort has shown the advantages available from better communications and working relationships between the white-collar segment of a shipyard and the production work force users of the white-collar products.

This Report contains a section on APPLICATION OF FINDINGS for use by other shipyards interested in gaining the advantages identified through this Task.

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FINAL REPORT

for

TASK N5-89-4

Employee Involvement - White-Collar Work Force
(Phase I)

1. BACKGROUND

This Task was initiated in 1989 by SNAME Ship Production Committee (SPC) Panel SP-5 on Human Resources Innovation. The Task would cover the performance of a study entitled **Employee Involvement - White-Collar Work Force, Task N5-89-4**, for investigation and measurement of white-collar work force productivity, and the subsequent development and test application of redesign innovations, utilizing employee involvement techniques, toward improving the performance of this segment of the shipyard workforce. The white-collar segment would include engineers, planners, administrators, salaried support people, and similar white-collar contributors to the total shipyard effort. A Request for Proposal to perform the Task was issued by National Steel and Shipbuilding Company (NASSCO) on 30 October 1989. A competitive award was made to Robinson-Page-McDonough and Associates, Inc. (R-P-M) on 2 April 1990. Task Director was Rodney A. Robinson, Vice President of R-P-M.

The R-P-M Proposal for the Task noted that an investigation of white-collar work force productivity within the shipyard industry would be a challenging effort. Visibility into the performance of individuals in this segment of the shipyard work force has been hazy at best, with the haze growing more dense as the overall size of the shipyard increases. White-collar inefficiencies and their associated expense to the shipyard may essentially be invisible to management, who simply see the production work force as not producing adequately. A common reaction is to throw more production workers at the problem, and to step up the application of overtime in order to meet

the delivery These actions treat the effect, but not the cause. And since the production worker portion of the shipyard is the largest and most expensive in terms of total manpower cost per day, the impact of such a reaction can be devastating.

The R-P-M Proposal further stated that this Task should be carried out in a small shipyard, where the added problems attending large white-collar organizations are minimal. This would allow the investigation to treat several different full segments of the white-collar work force, rather than being limited to only pieces of larger groups, as would be necessary in a large shipyard. Furthermore, the subsequent test application of work redesign techniques could be applied to a whole white-collar function in a small shipyard, rather than only to a few of the workers in a larger group performing that function in a large shipyard. Later on, the techniques developed during this Task could be adjusted to suit their application in a large shipyard environment. The initial investigation, development, and test application of these techniques, therefore, would proceed more effectively in a small shipyard where the problem areas could be surrounded and treated in a reasonable length of time.

One other significant point in the R-P-M Proposal for this Task was that members of the production work force at the shipyard would be involved in the activities designed to improve white-collar productivity. That is, the white-collar segment of the shipyard would not be the only group treated, as has been the case in other industries. The Task would recognize and build on the communications and operational relationships needed between white-collar workers and blue-collar workers in order to improve the productivity of the white-collar group. The rationale behind this approach was quite simple, and was based on a fundamental principle of information feedback. The white-collar segment produces a product. The principal user of that product is (ultimately) the production workforce. The producer must have information feedback from the user on whether the product is producing the results desired, so that adjustments can be applied as necessary. This feedback mechanism ensures that the overall process is carried out in the best interests of all participants. Two points are of immediate concern.

First, the white-collar producer needs to understand clearly the basic capabilities of the user, and the specific procedures and operations through which the white-collar product will be applied to produce the ship. This information (blue-collar to white-collar) is essential to the initial creation of a product that will be usable and can be readily applied. We might assume that the white-collar segment already knows all about the production side of the shipyard, particularly since many of the people in the white-collar segment may have previously worked in production areas. Experience tells us, however, that this is NOT the case. White-collar people tend to concentrate (and rightly so) on their own part of the overall effort, which often demands single-minded determination to resolve one onerous issue after another. Concurrently, the continuing changes in production techniques, and the dynamic nature of production activities, place the 'outsiders' further away every day from the pulse of production. Soon the information gap grows to surprising proportions, and continues to widen as each new production situation presents itself. Unless there is some sort of bridge, regularly traveled by all of the participants, the hope for true progress is dimmed.

Second, the white-collar producer must stay in close touch with user problems and concerns as they develop so that problems can be resolved quickly and decisively. The 'ostrich technique' does not work in an industrial atmosphere, What you don't know WILL hurt you, eventually if not sooner. For the white-collar segment to gain the needed degree of intelligence about everyday activities in the production work area requires a system of timely and FAITHFUL communications among the people involved. And this is not enough! Problems must be identified BEFORE they impact production work and cause costly delays and disruptions in the ship production processes. This requires careful and complete communications in the OTHER direction (white-collar to blue-collar), so that the production side can understand white-collar intentions, and can assist in identifying potential problems while there is still time to correct them with minimal cost in time and money. Again, we might assume that, our informational networks and problem-handling paperwork will save us from this dilemma, and well they might. But since most of this intelligence is generated after the fact, we must rely on our PEOPLE to keep us aware of this kind of judgmental information before the fact. This is the really tough part of the problem, because it demands an operational closeness among the 'team

members' that will survive the rigors of the workplace and allow the stream of communications to continue IN BOTH DIRECTIONS, a condition that is absolutely vital to a successful effort.

In consideration of these two points, then, this Task simply could not treat only the white-collar side of the question, as has been done in other industries where the volume of white-collar products and the repetitive nature of operations allows such parochial treatment.

Finding a small shipyard with an on-going workload sufficient to support this investigation was recognized as difficult enough in the prevailing economy. Finding one with a disposition to attempt this sort of improvement effort, and willing to share the findings with the rest of the industry, would be doubly difficult. An agreement, however, was secured with Peterson Builders, Inc., Sturgeon Bay, WI to serve as the 'guinea pig' for this Task. PBI would have an adequate workload over the several months of Task performance, a progressive and responsive management team, a dedicated and effective work force, and a willingness to share NSRP task findings with the shipyard industry.

Contact was made with the American Productivity and Quality Center in Houston, TX, to explore with them the material available from their group to measure and improve white-collar productivity. It was noted, however, that shipyard work is usually not of the high volume and repetitive nature found in many other industries. Techniques that work elsewhere might need adjustment when applied to the shipyard situation, where often cases are found where the work procedures may be seldom, if ever, repeated. Such custom involvement would demand special attention during studies of this type. The technical approach to this Task, then, would be to use those portions of existing information on white-collar productivity measurement and improvement as might be deemed most useful, along with current knowledge of industrial engineering procedures for worker performance measurement and an understanding of shipyard procedures and practices, and to develop with PBI a four-phased program for performing this Task over a period of about 12 months:

(1) Measurement of base-line productivity in several white-collar functional areas at PBI;

(2) Identification of those white-collar functional areas at PBI most amenable to improvement through employee involvement techniques, and other work redesign avenues;

(3) Development of work redesign innovations, through employee involvement techniques and other industrial engineering procedures, for direct application in one or more specific functional areas;

(4) Test application at PBI of actual improvement efforts in as many white-collar functional areas as the project could support.

2. PREPARATIONS

The approbation of most senior shipyard management was recognized as essential to the success of a project like this one. Initial preparations, therefore, were carried out to ensure that such support was both present at PBI, and was advertised to the workers involved before any measurements were made or discussions were held with the workforce. Each senior manager associated with the personnel who might be involved in the Task was briefed in complete detail as the first step of the project, and thereafter before any other specific actions were carried out. These briefings were carried out by the Task Director, and usually one-on-one with the senior manager involved. This portion of the Task required a considerable amount of time, but was absolutely essential to the successful performance of the Task. There must be NO surprises at this senior management level, which for this Task included the General Manager, the Vice President of Manufacturing, the Vice President of Operations Support, and the Vice President of Human Resources.

This point of preparation is made first and foremost in this Report to emphasize the importance of this action. These senior managers were Nor expected to take any specific actions themselves during prosecution of the Task, but would be kept fully appraised of activities as they unfolded, and

made aware of each significant new action to be taken within the Task before it was attempted. Having these senior managers 'tuned in' on the details of the Task, albeit deliberately distant from the participants themselves, created an atmosphere of agreement and support without which the Task could not have been so successful.

3. DETAIL DESCRIPTION OF TASK ACTIVITIES

Subtask (1): Assessment of Initial Conditions at PBI

Comprehensive interviews were conducted with selected PBI personnel from several segments of the shipyard. The participants were carefully selected through consultation by the Task Director with two knowledgeable and established members of the PBI workforce, in order to cover a representative cross section of the shipyard. Both white-collar and blue-collar workers were interviewed. Each interview was set up for 1 hour, one-on-one with the Task Director. The same questions (Appendix A) were asked each person interviewed to aid in subsequent analysis of the answers. All interviews were completed before any analysis of results was made. This point would help to ensure that bias was not inadvertently introduced during the interview discussions which, because of the number of individual interviews, took place over a period of several days. Although PBI senior management was made aware of who was being interviewed, they did not influence the selection of interviewees or the questions asked of them.

The interviews revealed that PBI had committed a large amount of effort to employee training under the Transformation of American Industry (TAI) format, and also to Total Quality management (TQM), which PBI chose to rename and redefine as Continuous Quality Improvement (CQI). It was immediately clear that this Task should capitalize on the training already carried out, since a large number of workers had completed these courses and were familiar with many of the techniques espoused. Building on this base of knowledge was expected to improve the chances of performing the Task successfully.

After all interviews had been completed, the results were analyzed and assessed. The overwhelming message from those interviewed was that people were not communicating effectively with each other. They might talk now and then, but basic and regular communications were missing. Often the only time that common problems were addressed was after an equipment interference was encountered, material was unavailable when needed, or a sequencing problem arose that the shop or trade could not resolve independently. In such cases, the production people were the ones with the problem, which usually occurred well into the ship construction period and with essentially NO time for working out a solution. The white-collar segment would be involved in problem resolution only on request. This condition appeared to be most troublesome in two functional areas; structural, and electrical. The other functional areas of the shipyard appeared to be in a similar but less severe condition.

Subtask (2): Establishment of a Productivity Baseline

Several ideas were explored in an attempt to set up a reasonable baseline for productivity assessments, as follows:

The number and content of Production Change Requests (PCR's) was examined. These documents are generated by PBI production workers as a vehicle with which to communicate with PBI engineering (most often) and other support people at PBI. From the information gathered during the interviews, it was clear that PCR's were being used only by certain groups in the shipyard, and then only after other avenues had been exhausted. They were clearly not a popular way to communicate, and were often used only as a last resort. Even the name of the form was a problem to some workers, since it suggested that the change was something that production was requesting to satisfy their own interests. In fact, the PCR was simply reporting a problem, about which production did not much care either way except to get it resolved so that construction might continue.

The number and content of drawing revisions was examined. These revisions, made by PBI engineering people, were found to be quite dependent on the quality of the basic design drawings received from the outside design agent. This fact might cause some bias in the message gained from analysis of

drawing revisions, and so this potential baseline indicator was abandoned.

The population of Engineering Change Notices was examined. ECN's are used when problems arise in carrying out the basic design. Since they might reflect the closeness of PBI engineering with PBI production activities, they would be tracked further.

The 'mobility' of PBI engineering people was examined to see whether they were personally going to the production sites within their assigned areas of concern 'frequently, often, or seldom'. This indicator might reflect the working relationships between engineering people and production people, and might shed some light on the nature and degree of communications taking place.

The general attitudes exhibited by the various players were examined. These would be a valuable indicator of just how well things were going, and how close the working relationships were among the several groups involved in carrying out daily operations. If, indeed, improvements could be obtained through employee involvement techniques, an early indicator would be a change in the personal attitudes of those closest to the pulse of the shipyard.

Subtask (3): Determination of Functional Areas to be Treated

The decision on what functional areas to treat during this Task was not a difficult one to tie. The structural area and the electrical area were most in need of improvements in working relationships and communications. Each area had its own unique problems, but both shared the common need for better and more timely understanding of problems as they develop, and for closer cooperation in resolving matters of mutual interest before a full-bloom snag was encountered. It appeared from the start that each of the white-collar groups at PBI enjoyed the basic capability to do their jobs efficiently and well once they fully understood the details of the problems. What was missing, however, was the faithful exchange of detailed information from production people to white-collar people, and from white-collar people to production people. This gap in communications was creating an unproductive atmosphere. A lot of wheel-spinning, and even some buck-passing, was evident.

To improve white-collar productivity, it was decided to tackle the problem of communications first? followed closely by working relationships in both of these functional areas.

Subtask (4): Creation of Action Teams

An Electrical Action Team (EAT) and a Structural Action (SAT) were set up as the vehicle through which improvements would be attempted. The composition of each team was determined very carefully through extensive discussions among the Task Director and the two PBI people who assisted in setting up the interviews mentioned earlier. The aim was to include on each Action Team the optimum mix of white-collar people and production people, so that all elements of daily operations in that area were represented. It was desired that each team member be able to recognize the action needed in his particular area, be it engineering, planning, material, or production. In many cases, the Action Team member would be able to take that action himself. In the more extensive cases, however, he would carry the message back to his parent organization, discuss the details with those responsible for resolving the matter, and follow up on the corrective activities until the basic need was satisfied to the satisfaction of the Action Team. This arrangement would provide the capability to develop improvements, as might be identified later on, with only an occasional need to invite others to join directly in the deliberations of the Action Team. It was also desired to keep the size of each Action Team from growing too large. About 15 people was set as the maximum number, with 10 to 12 as the preferred range. The initial composition of the two Action Teams MS as follows:

Electrical Action Team -

- Electrical Engineering Section Head
- Electrical Engineering Staff Member
- Electrical Engineering Staff Member
- Material Control Group Member
- Planning Supervisor
- Planning Group Member
- Electrical Superintendent
- Electrical General Supervisor
- Facilitator (from Human Resources Group)
- Task Director

Structural Action Team -

- Hull Engineering Supervisor
- Hull Draftsman/Designer
- Material Identification Group Member
- Planning Supervisor
- Planning Group Member
- Materials Management Representative (Purchasing)
- Shipfitting Superintendent
- Shipfitting General Supervisor
- Shipfitting General Supervisor
- Shipwright General Supervisor
- Facilitator (from Accuracy Control Group)
- Task Director

It is important to reflect for a moment on the process of selecting Action Team members. There was absolutely no attempt to exclude an individual because of an ominous personal attitude or expressed opinions. On the contrary, every potential member was assessed on the basis of position in the shipyard, assigned responsibilities, and ability to influence the activities of others. This resulted in the creation of Action Teams representing the true 'life blood' of the shipyard at the operational level, with members who should be able to handle the down-stream improvements when they become apparent.

Final selection of the Action Team members received the approbation of senior management in each case. Then, and only then, was the information on Action Team members made known to the personnel involved, and their immediate supervision.

Meetings of each Action Team were established as once-a-week, for a duration of not more than one hour. Unfinished business would be carried over until the following week. This arrangement established a known commitment of time for each attendee, minimizing the disruptive effect on other activities. Meeting minutes would be kept, and an Agenda would be published prior to the next meeting. The atmosphere during the meetings would be kept informal, but control of the discussions would be exercised by the Facilitator or the Task Director until such time as their involvement might be lessened or removed entirely.

Subtask (5): Implementation of Action Teams

Both Action Teams followed the same pattern for the first three meetings, as follows:

Meeting No. 1 - A kickoff meeting, where the purpose of the Action Team was explained, the meeting set-up was described, and the members began to interact with one another. This initial experience was tense, with considerable apprehension noticeable among the members. Their contributions to the general discussion were minimal and guarded, with several members clearly relieved when the meeting was adjourned.

Meeting No. 2 - A brainstorming session, where problems of every description were brought up under carefully controlled general rules. These rules were:

- Ž Each member could bring up only one item at a time.
- Ž The turn would then pass to the next member, moving around the table until everyone had run out of problems (or the meeting time had run out).
- Ž No member could make any comment on another member's item when it was brought up, pro or con.
- Ž Every item would receive equal consideration.
- Ž An existing item could be modified or clarified by another member when his turn came, but the original item would stay the same.

Following this format, and with two Facilitators writing down the items on two flip charts, the Electrical Action Team generated 66 items, and the Structural Action Team generated 99 items, each in the space of ONE HOUR.

Member attitudes during these second meetings were essentially unchanged from the first ones. The atmosphere was still 'heavy', with member participation as required and not much else. These sessions were designed to get each of the members to express, but not discuss, items of common interest, which would continue the process of getting the members to feel more comfortable in each other's presence. Progress in this regard was slow, but in the right direction.

Meeting No. 3 - A categorization session, where each of the problem items brought up were assigned to one of 12 categories. Once each item had been assigned to a category to the satisfaction of all members, a VOTE (using Nominal Group Technique) was conducted to see which category should be pursued further as the highest priority concern of the members. Results were as follows :

Electrical Action Team -

Material Identification was the big winner. This reflected the dire and continuing need for improvements in the timeliness and quality of electrical material at the work site.

Structural Action Team -

Material Availability and Communications came in as a TIE. It was therefore agreed to discuss both items, which probably had a common thread anyway.

These sessions began the process of developing positive interaction among the members. Member attitudes and participation during these third sessions were beginning to warm up a little bit, with a noticeable decrease in atmospheric tension. Some apprehension remained, particularly in regard to whether any improvements could realistically be achieved despite the need for them. Generally, however, barriers were beginning to show a few cracks, and the future looked a little more promising than it had up until this point.

Meetings Nos. 4 through 6 - These were working sessions where specific problem items were discussed. By the end of Meeting No. 6, open exchanges were taking place among the members, and several possible avenues of resolution were being explored for the main items on the agenda. The Facilitators were active in controlling the discussions, but the need for their involvement was beginning to decrease.

Meeting No. 7 - For both Action Team this meeting included the development and acceptance of a Mission Statement, and the selection of an Executive Sponsor. Now the two Action Teams were getting formally established within the PBI framework for this type of group. Both Action Teams decided to elect, at the next meeting, a Chairman and a Note Taker from among their members. A volunteer Note Taker emerged on the Electrical Action Team, and was promptly accepted by the group.

Meeting No. 8 - This meeting saw the election of a Chairman within each Action Team, and also the election of a Note Taker for the Structural Action Team. The role of the Facilitators was now reduced to the point that each Action Team was essentially running by itself, under the direction of the Chairman.

Meetings Nos. 9 through 24 - For both Action Teams, these meetings addressed a regular pattern of items, with different specifics in each functional area but with similar types of agenda items. Both Action Teams treated two generic types of problems: (1) short-range problems within the resolution capability of the Action Team members; and (2) larger and longer-ranged problems that required the involvement of others outside of the Action Team members. A few specific items are described below.

Electrical Action Team:

The principal thrust of several meetings was concern about electrical material identification and availability information. The members were distantly aware of an effort underway at PBI to improve overall shipyard operations through a technique called Integrated Business Systems (IBS). A modeling technique (IDEF) was being used by the IBS Group to capture the 'as-is' situation for later use in developing the 'to-be' arrangement. In the material area, three specific items were being treated by the IBS Group: the Material Ordering System; the Material Management System; and the computerized Bill of Material. These three items were of special interest to the EAT members, several of whom were regular users of this information.

Several meetings were therefore devoted to articulating particular concerns in these three material system areas for later transmission to the IBS Group for their consideration. The intent was to provide the IBS Group with first-hand user concerns and suggestions that might prove beneficial during the deliberations of the IBS Group. Eight separate and specific items of concern were generated, developed, and carefully described by the EAT. A decision was then made to send these descriptions to the IBS Group, along with an invitation for representatives of the IBS Group to attend an upcoming EAT meeting where two-way communications about these items could be carried out. The invitation was accepted by the IBS Group, and an excellent exchange of information was held at the next EAT meeting (No. 19). The atmosphere was positive and enthusiastic on both sides, with the expectation that future modifications to these three material systems would reflect the information exchanged. This will clearly enable an improvement in white-collar productivity to the benefit of the using community.

During subsequent discussions, the IBS Group decided to seek the agreement of the EAT to be the 'window' into the PBI electrical area through which IBS ideas and intentions might be initially presented sometime in the near future. Following such a presentation, these items might be discussed so as to provide feedback to the IBS Group on how these initiatives might work out in actual usage. Furthermore, the IBS Group voiced their support for similar additional 'windows' through the creation of Action Teams in other functional areas at PBI. Clearly, this posture constituted a strong endorsement of the value gained by the white-collar segment from the information exchanges that took place through the EAT.

In another specific area, the EAT members addressed the contractual requirement for calibrating meters in electrical panels. Practice had been to remove the meters from the panels, transport them to the shipyard calibration laboratory for calibration verification, transport them back to the ship, and reinstall them into the panels. This practice was time consuming, costly, and fraught with opportunities for meter damage. Several PBI support people were invited to attend an EAT meeting to discuss the possibility of in-place calibration verification of panel meters, a practice that would require some equipment purchase and training, but which would potentially save the shipyard

a substantial amount of time and money. As a direct result of the EAT involvement in this matter, a procedure for in-place calibration verification of meters in electrical panels was established. Once again, the white-collar product was better able to satisfy the overall interests of the shipyard because of the communications provided through the EAT. Working relationships were strengthened through the cooperative discussions that took place, and enough money will be saved by this one item alone to pay for all of the EAT meetings held during this Task.

Structural Action Team:

A major thrust of the SAT was to investigate the cause of time-consuming problems in the flow of small fabricated wood parts for the minesweeper (MCM) ships. The internal information system covering these parts would show that fabrication of certain parts was complete, but when the downstream installing shop would try to draw these parts out for installation, they were not available in the warehouse or in the fabrication shop. Delays were commonly encountered while a search was made for the supposedly 'available' parts.

A flow chart was made to show every step in the laminating and fabricating process. Representatives from these two shops were invited to attend the SAT meetings so that agreement might be obtained on the details. Despite several tries at improvements, and at least one substantial change in the software for the information system, the problems persisted. Finally, one seemingly small step was found to be missing from the flow chart, and this step turned out to be the key to establishing when a part was truly completed. Once this point was brought to light, the communication problem that had plagued this particular area on every MCM constructed at PBI over the past several years was now resolved. The savings in installing shop manpower through drastic reductions in 'parts chasing' activities will be several times greater than the cost of all of the SAT meetings held during this Task. The white-collar product that was improved in this case was a computerized tracking system, now adjusted to reflect the true status of the parts being tracked.

particular problem endorses the importance of having a process flow ALL aspects of an operation. Such a complete flow chart will disclose four types of activities:

Type 1 - part of the process + value added to the final product;

Type 2 - part of the process + no value added to the final product;

Type3- not part of the process + value added to the final product;

Type4 - not part of the process + no value added to the final product.

Careful examination of each activity on the process flow chart will disclose the exact nature of that activity (Type 1, 2, 3, or 4). This will promptly reveal those activities that are candidates for modification, or even outright elimination. It may even be the activities that are not a part of the basic process that are causing the problems in the first place.

One other regular feature of the SAT meetings was a brief presentation by the engineering members on what was going to be issued to production in the immediate future. At first the only information presented was on those items that had been fully researched and were considered firm by engineering. That is, there was no discussion of 'maybe' items or those still under technical consideration. As the meetings progressed, the working relationships among the SAT members became closer and less uncertain, and confidence was growing among the members. Now the engineering members were more willing to volunteer information even if it was still up-in-the-air. This produced a virtual breakthrough in communications (at about meeting No. 19), which allowed the regular discussion of 'potential' problems to take place at each subsequent meeting. Although the effect on white-collar productivity of these more 'open' discussions was not captured during Phase I, there is no doubt that the benefits will be large and in the right direction.

Subtask (6): Assessment of Results

The appearance of changes in the baseline indicators selected for measuring improvement in white-collar productivity did not materialize as soon as was expected, with one exception. That exception was the general attitudes exhibited by the various participants. Within the Action Teams membership, noticeable changes in personal attitudes were seen as early as the 5th or 6th meetings, with major changes apparent by about the 9th or 10th meetings (that

is, after the meetings had been running for about three months). Thereafter, steady improvements were seen, with positive working relationships continuing to develop among the Action Team members.

Outside of the Action Team members themselves, changes in the attitudes of those interfacing with the Action Teams were seen shortly after these 'invitees' had participated in the meetings. First among this segment was the IBS Group, whose prompt reaction was to endorse the EAT as a way for IBS efforts to be introduced into the shipyard processes, and from which feedback on implementation of these ideas might be gained. In addition, the IBS Group quickly supported the potential for establishing similar Action Teams in the other functional areas of the shipyard, so that the same advantages might be gained in those areas also.

The attitudes of senior shipyard managers followed a similar vein. These senior managers (identified earlier) were briefed by the Task Director on a continuing basis throughout this Task. As the end of the Task was neared, the Task Director raised the possibility of abandoning the Action Teams, since they were no longer needed to support the Task. The consensus of the senior managers, however, was that the two Action Teams already in place should continue to operate. Since these two Action Teams had been 'institutionalized' (during the 7th meetings), having them continue in operation would not require any additional or special action. This senior level of management also indicated that consideration would be given by PBI to setting up similar Action Teams in the other functional areas of the shipyard.

In regard to the other baseline indicators selected for this Task, the following observations apply:

The population of Production Change Requests (PCR's) appeared to be unchanged during the performance period of this Task. The PCR system itself continued to be supported in some areas and not in others, apparently unaffected by the activities of the two Action Teams.

The situation surrounding Engineering Change Notices (ECN's) was somewhat different, since these items were being discussed freely during the SAT meetings. To the extent that this noticeable improvement in information exchange was now taking place, the ECN system was gaining credibility. However, the number and nature of ECN's showed no significant change.

The 'mobility' of PBI engineering people, along with white-collar material people and planning personnel, seemed to show more activity due to the Action Teams, but definitive data to support that observation was not available. Similarly, visits and discussions by blue-collar workers with their white-collar counterparts seemed to be more prevalent as the end of the Task performance period was reached, but firm data to support this condition was not in evidence.

After the Action Teams had operated over a period of 6 months, each Action Team member was asked to fill out a questionnaire (Appendix B) to provide some insight into how this Task had proceeded. Although this information sample of 15 replies, 5 from production members and 10 from white-collar members, was too small to be statistically sound, the results were interesting:

93% felt that meeting for 1 hour per week was about right.

80% of the production members felt that engineering (and other white-collar) matters were the best topics discussed.

44% of white-collar members felt that the best topics discussed were those that could be resolved by the Action Team members.

One white-collar respondent stated that ALL topics discussed were important.

66% felt that problems beyond the capability of the Action Team members to resolve were the worst topics discussed. However, 2 respondents stated that there was NO worst topic discussed.

The EAT/SAT was value rated by all respondents at 6.9 (on a scale of 1 to 10 (high)). However, the production members value rated the EAT/SAT at 7.8.

73% felt that white-collar productivity had stayed the same during the 6-month period of EAT/SAT operation. One respondent added that 6 months was too short a time period to reveal any major improvements. 40% of production members, but only 20% of white-collar members, felt that white-collar productivity had improved during the 6 month period of EAT/SAT operations. No respondent indicated that white-collar productivity had dropped.

80% support+ the idea of Action Teams in other functional areas.

93% felt that better cross-functional communications were needed.

At this point it was decided not to wait any longer for the baseline productivity indicators to change. The 12-month performance period of this Task was exhausted. In view of the fact that Phase II of this Task would be performed at PBI with little or no interruption in activities, it was decided to continue tracking the results of these two single-function Action Teams into Phase II. This would provide additional opportunity for these indicators to show changes which may reflect on the nature and magnitude of white-collar productivity, while causing minimal impact on Phase II operations. (Phase II of this Task is discussed under paragraph 5. CONCLUSIONS AND RECOMMENDATIONS, which appears on page 24.)

4. APPLICATION OF FINDINGS

The results of this Task have demonstrate that white-collar productivity in a shipyard environment can be treated effectively with the Action Team technique. From the lessons learned during Phase I, the following guidelines are suggested for use by other shipyards interested in developing this approach:

Step 1: Gain the confidence of most senior shipyard management.

This action is clearly the most important to a successful operation. This level of management be kept in close touch with the activities of each Action Team on a frequent and regular basis. The amount of time needed

to effect changes in the attitudes of the workers must have up-front recognition and acceptance, because it is not an 'overnight evolution'. Attempts at short-cuts, particularly in the early going, can devastate the fragile balance being nurtured among the participants, and send progress back to square one. In addition, the subject matter selected for discussion at the Action Team meetings must be selected by the members themselves. They must feel empowered to control their own destiny in regard to the topics being treated. Senior management needs to know what is going on at the meetings, but must resist the temptation to get directly involved.

Step 2: Recognize the need to involve production workers.

As users of the white-collar product, production workers hold two important keys to achieving success:

(1) detailed and up-to-date information on actual performance of the many procedures and operations that will create the shipyard product, which information is essential to the original development of a good white-collar product; and

(2) information on how well (or how poorly) the white-collar product is actually supporting the various production activities, which information forms the valuable feedback needed by the white-collar faction to truly improve their contribution to the total effort.

Failure to recognize and treat the full scope of white-collar impact may result in improving the quantity and timeliness of the white-collar products, while ignoring the actual usability of them. Such an oversight could make matters even worse by more fully masking the real cause of shipyard difficulties,

Step 3: Assess initial conditions within the shipyard.

A series of 1-hour interviews with selected workers will provide a suitable profile of existing relationships among the groups involved, and will also generate information on training and operational capabilities upon which

to build the overall effort. It is important to recognize that interviews of this type should be conducted even though current information appears to be already in hand. It takes only a short while to conduct the interviews, and when properly done they can reveal a wealth of information on how things are perceived by the workers themselves. Recent attention to the idea of Action Teams is quite extensive throughout the shipyard community. This approach will therefore find familiarity in most locations.

Step 4: Establish baseline productivity indicators.

Even though this step fell short of the mark during Phase I of this Task, the need to carry it out was not diminished. Several indicators should be selected and measured to provide the starting points for later assessments of white-collar productivity. Once established, these baselines should not be changed as developments occur, but rather should remain as stable reference points against which to assess progress.

Step 5: Select the functional area(s) to be treated.

In most cases, this determination will be straightforward. The smaller the area, the better the chances of success (at least initially). In a large shipyard, the area to be treated may be limited by the sheer numbers of workers involved (both white-collar and blue-collar). The composition of the Action Team should include enough workers to 'surround' the problem area, while staying at about 12 to 15 total people. If the area selected for treatment turns out to be 'too big to handle', simply reduce the scope of the function until everything 'fits'. In the smaller shipyards, treating a full function should not be a problem.

Step 6: Create the Action Team(s).

The members of each Action Team should be selected carefully. Individuals who have a good grasp on their own activities, and show evidence of ability to influence others, will be good choices. Keep in mind that the total team membership should encompass nearly all aspects of the functional area being treated, so that 'call-ins' will not be needed. Do not reject workers

be-use they are too busy, or too noisy, or too difficult to control. Select the best members for the team based on their ability to communicate, to recognize that changes are both needed and are usually difficult to achieve, and who will ultimately make a meaningful contribution to the team. Do not announce the selections until senior management has been made aware of them, and the supervisors affected have voiced their agreement.

Step 7: Implement the Action Team(s).

Limit the Action Team meeting duration to one hour per week, preferably at the same convenient location so that the members will become familiar with the surroundings. The use of a Facilitator is recommended, someone who has no particular vested interest in specific topics, but rather someone who will keep the conversations alive and member interest up. Do not try to hurry the process along, at least initially. Time is a tool to be applied carefully in first developing a viable communications network among the participants, and then in creating a strong working relationship that will withstand the unrelenting and always urgent demands of the workplace. Once these two attributes are firmly established, perhaps three to four months downstream, the time element will become less sensitive, and more latitude will be available for adjusting Action Team meeting dates and durations. Early agenda items should be designed for 'team building' rather than for treating specific subjects. After a few meetings, the team should select a Chairperson and Recorder from within their ranks, so that eventually the role of the Facilitator can be reduced. These duties can be rotated on a reasonable basis (several months) if desired. Each meeting should have a printed agenda, and meeting minutes should be kept and published to the members.

Step 8: Assess the value of the Action Team(s).

After the Action Team(s) has been in operation for several months, a deliberate assessment should be made to help in deciding whether or not to stay in operation, and whether any adjustments should be made in the membership. If advantages are accruing, then continuation is indicated. Otherwise, it may be better to abandon the team, recognizing that it will suffer some startup problems if it is reinstated later on. Changing one or two of the

team members may strengthen the overall effort, and invigorate the remaining team members to new heights of achievement.

The effectiveness of this step will be improved if management focus is maintained on the TEAM, rather than on the projects being treated by the team. There is, of course, a continuing need for feedback to management on team activities, and there may be an occasional need for management follow-up on a specific item. Generally, however, the team will continue to function effectively once the members can see their own successes, and realize that they have been empowered to make the necessary changes by themselves. The management role becomes one of supporting the TEAM, and allowing it to operate as a cooperative entity.

This is also a good time to evaluate whether additional teams in other functional areas might be helpful, recognizing that the startup times for the new teams must be accommodated.

5. CONCLUSIONS AND RECOMMENDATIONS

General Conclusion

Performance of this Task at PBI produced results that were better than anticipated. The Action Teams that were established, one electrical and one structural, both functioned extremely well. The Action Teams demonstrate that favorable worker attitudes and working relationships can be strengthened through employee involvement techniques. Several instances of white-collar improvements were seen, with more developing almost daily. Three segments of the white-collar community at PBI - as it applies to these two specific functions - were treated; material support, planning, and engineering. All three segments were responsive, and show promise of continuing improvements.

Recommendation 1: Continue the Action Teams at PBI.

At the completion of Phase I, the attitude among the senior managers at PBI was to continue the two Action Teams beyond the end of the Task, and also to promote the idea of establishing more Action Teams in the other functional areas of the shipyard. Such intentions clearly endorse the advantages gained from this approach. Both actions are strongly recommended.

Recommendation 2: Establish Action Teams in Other Shipyards

Other shipyards should consider the establishment of Action Teams, following the guidelines under paragraph 4. APPLICATION OF FINDINGS. An additional inducement to try this approach will be found in the success achieved at General Dynamics Corporation/Electric Boat Division through the use of Union Driven Safety Action Teams (see NSRP Report #0301 of June 1990 entitled Employee Involvement/Safety for details). The composition of the Action Teams at GD/E6 was similar, although the focus was on safety rather than on white-collar productivity. Nevertheless, the Action Team approach appears to be a versatile tool in the shipyard improvement arsenal.

Recommendation 3: Investigate Improvements in Cross-functional Communications

During Phase I little, if any, regular and deliberate inter-functional communications were apparent. This symptom is common to many shipyards, where cross-functional communications are usually weak at best, and may be missing entirely until forced by inopportune production interferences and sequencing problems that occur downstream. Investigation into this area should create new opportunities for the white-collar product to better match the needs of the overall production effort, while avoiding costly impacts during the construction period.

Due to the foresight of SNAME Ship Production Committee (SPC) Panel SP-5, and the interest of the SPC Executive Control Board in promoting this area of research, Phase II of this Task will proceed almost immediately following the completion of Phase I. At the meeting of Panel SP-5 held at Groton, Ct' on 5/6 June 1991, the members present endorsed' the Work Statement for Phase II, allowing this effort to take place at PBI in the immediate future and without any significant interruption in the overall Task. Phase II will investigate and develop innovations for cross-functional communications in a shipyard. This unique effort will expand upon the Action Team approach proven successful during Phase I, and clearly will need to focus on the shipyard engineering group where cross-functional improvements probably should originate. It will also, however, search for ways to establish and develop inter-functional improvements at the operational level before inter-trade problems arise. This two-pronged approach is a major expansion of the Project, which PBI has agreed to host. Concurrently, the activities of the single-function Action Teams of Phase I will continue to be tracked for an additional year during Phase II, and white-collar productivity improvements resulting from improved communications and closer working relationships will be assessed and included in the Final Report on Phase II.

APPENDIX A

Questions asked during interview sessions at PBI.

- D-1 Do you use the Production Change Request (PCR) program?
- D-2 What is wrong with it?
- D-3 How do you interface with engineering?
- D-4 Are drawings/technical requirements clear and effective?
- D-5 Is the PCR form itself a part of the problem?
- D-6 Could you perform better with an improved product from engineering?
- D-7 Are Engineering Change Notices (ECN'S) timely and effective from your point of view?

- M-1 Is material procurement a problem area?
- M-2 What about going after 'least installed cost' ideas?
- M-3 Do you have examples where different material would lower production costs?
- M-4 Is material available when needed? Or do you have to work around missing items?
- M-5 How do you tell the material people about your problems with material?
- M-6 Is engineering close enough to production?
- M-7 Is the schedule effective in coordinating production work and material delivery?

- T-1 What training is currently underway?
- T-2 How responsive and effective is the training program?
- T-3 Can you get the training you need?
- T-4 What training would you like to have set up?
- T-5 How do you go about getting it going?
- T-6 Do you have environmental training (on environmental requirements/regs)?
- T-7 Can you identify environmental training needs that exist now?

APPENDIX B

EAT and SAT Questionnaire

As a member of the EAT or SAT, please give us a little feedback on how you feel about the EAT or SAT group by filling out this questionnaire.

1. (EAT) (SAT) has been meeting for about one hour per week. Is this (check one) too little _____ about-right _____ too much _____

2. What is the best topic discussed at the meetings? _____

What is the worst topic discussd? _____

3. On a scale of 1 to 10 (10 being the highest), how do You rate the (EAT) (SAT) overall? _____

4. Do you think white-collar productivity has dropped _____ stayed the same _____ or improved _____ since the (EAT) (SAT) has been in opration (the last 6 months)?

5. Who needs to be added as a member of the (EAT) (SAT) to make it better? **(Job titles, not names)** _____

6. Do you feel having action teams in the other functional areas (sheetmetal, machinery, painting, etc.) of the shipyard is a good idea? _____

7. Do you feel that better cross-functional communications are needed? _____

8. Do you work in Prduction? _____

Please do not sign your name to this questionnaire.
Thank you.

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